
بسم الله الرحمن الرحيم

INVESTING



Presented by

Dr. Mohammed Hosny

Lecturer of Crowns and Bridges
Faculty of Dental Medicine
Al-Azher University

☺ The process of casting consists of surrounding the wax pattern with a mold made of heat resistant investment material, eliminting the wax by heating, and then introducing molten metal into the mold through a channel called the sprue.

DENTAL CASTING INVESTMENTS

They are composed of:

- **Refractory material**……………… *Silica*, responsible for the thermal expansion of the mold during wax elimination
- **Binder**…………………… *gypsum, or magnesium oxide and an ammonium phosphate compound.*
- **Modifiers**…………………… accelerators, retarders and reducing agents *e.g. (carbon)*.

Ideal properties of investment materials

- Able to control of expansion
- Produce smooth castings
- Accurate surface reproduction
- Chemical stability at high casting temperatures
- Adequate strength to resist casting forces
- Sufficient porosity to allow gas escape
- Easy recovery of the casting

Types of investment materials

- Gypsum-bonded
- Phosphate-bonded
- Silicate-bonded


Bellavest T
BEGO
BellaStar XL
BEGO
Bellavest SH
BEGO


PC15
INVESTMENT AND LIQUID
FOR PRESSABLE CERAMICS
100
ENVELOPES
100
GRAMS EACH
PC 15
PC 15
PC 15
PC 15
FastFire
Liquid

Gypsum-bonded investments

- Gypsum binder, with cristobalite or quartz refractory material
- Not chemically stable at temperatures above 1000°
- More porous
- Mixed with distilled water
- Produce smooth surface casting
- Used for casting of conventional type II,III, and IV gold alloys

Phosphate-bonded investments

- Binder: magnesium oxide and ammonium phosphate compound.
- Silica refractory material
- Mixed with colloidal silica
- Higher strength
- Higher expansion due to the special liquid
- Stable at high temperatures; suitable for metal ceramic alloys

Phosphate-bonded investments

- Carbon-containing materials are used for high gold or palladium alloys
- Carbon-free investments are used for base metal alloys
- Lower porosity
- Rougher surface

Expansion

Setting expansion

Occurs during setting of the material as a result of crystal growth

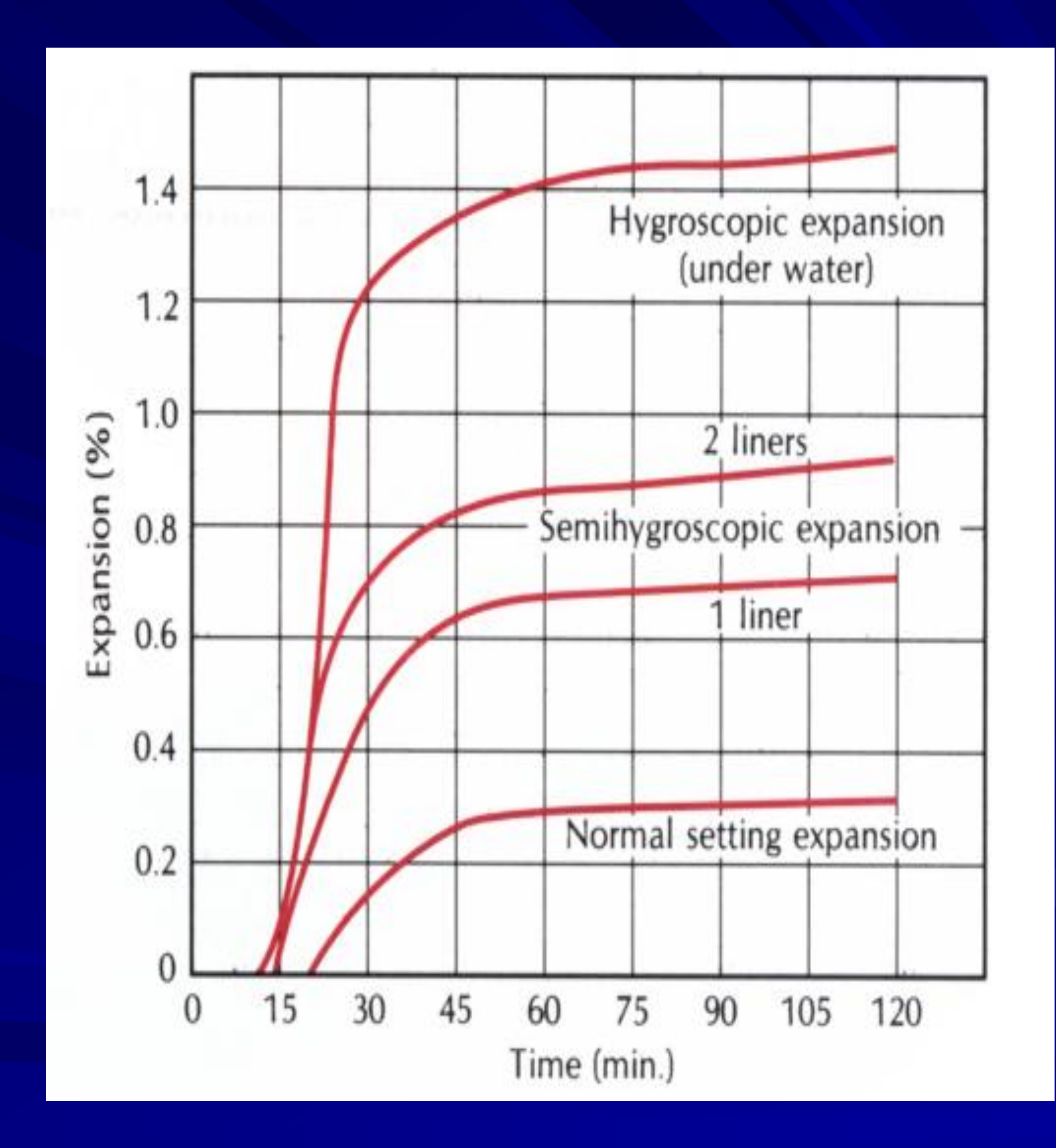
Hygroscopic expansion

Extension of setting expansion by adding water to the setting investment by:-

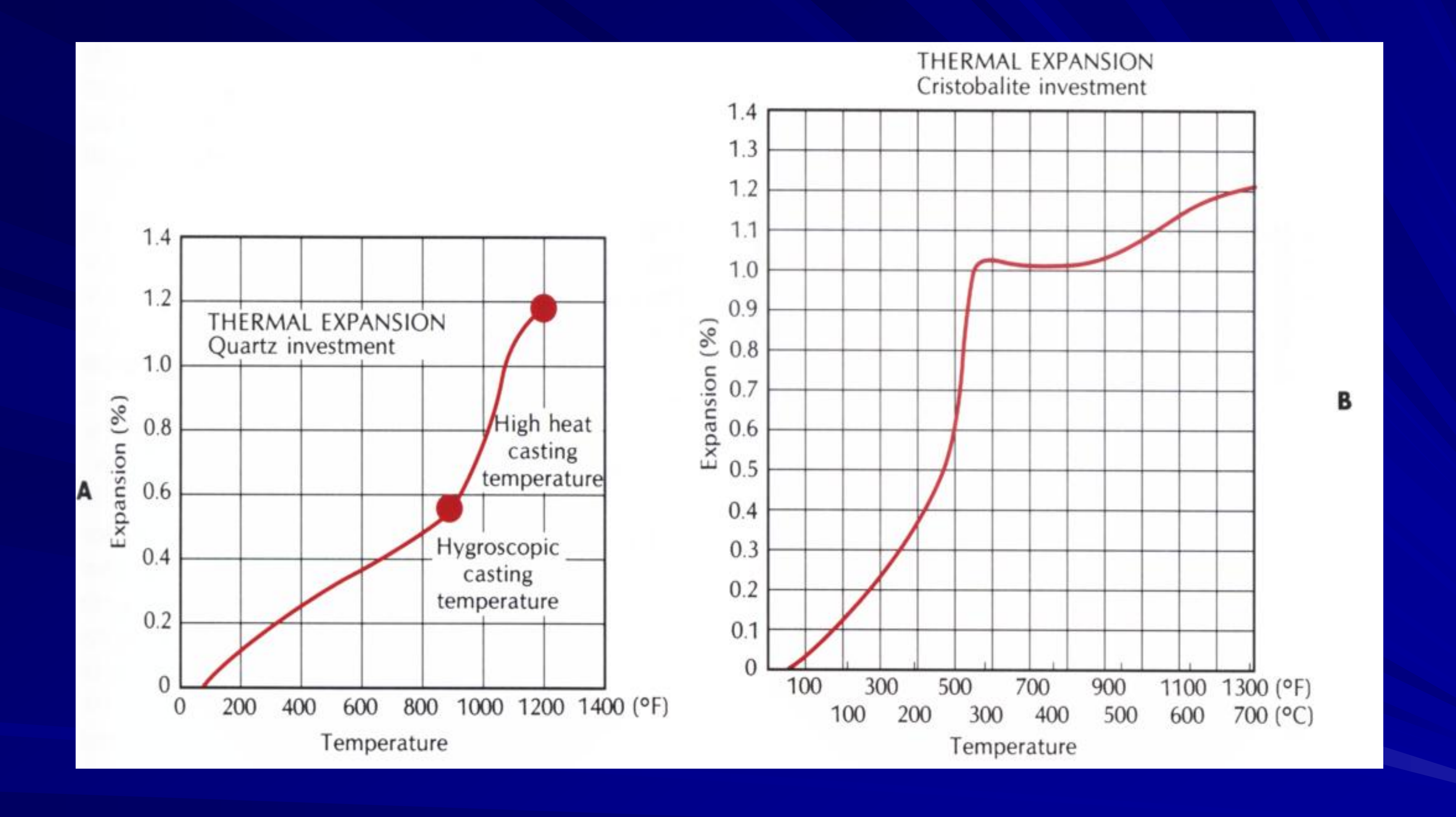
- Wet liner.
- Submerging the ring in a water bath at 37°C for 1 hour immediately after investing.

Thermal expansion

Solid-state phase transformations of silica. More controllable



Expansion (%)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
Hygroscopic expansion
(under water)
2 liners
Semihygroscopic expansion
1 liner
Normal setting expansion
0
15
30
45
60
75
90
105
120
Time (min.)


A
THERMAL EXPANSION
Quartz investment
Expansion (%)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
High heat
casting
temperature
Hygroscopic
casting
temperature
0 200 400 600 800 1000 1200 1400 (°F)
Temperature
B
THERMAL EXPANSION
Cristobalite investment
Expansion (%)
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
100 300 500 700 900 1100 1300 (°F)
100 200 300 400 500 600 700 (°C)
Temperature

How to increase expansion

- Use of two ring liners
- Prolonged spatulation
- Storage in 100% humidity
- Hygroscopic technique
- Lower water-powder ratio in gypsum-bonded and increase special liquid in phosphate-bonded

Investing techniques

- **Single investing**

1. Brush technique
2. Vacuum technique

- **Double investing**

Application of wetting agent (surfactant)







Mixing of investment









Brush technique

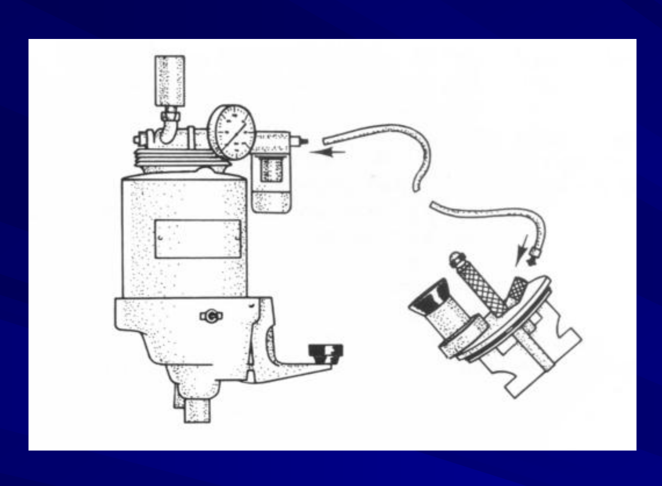




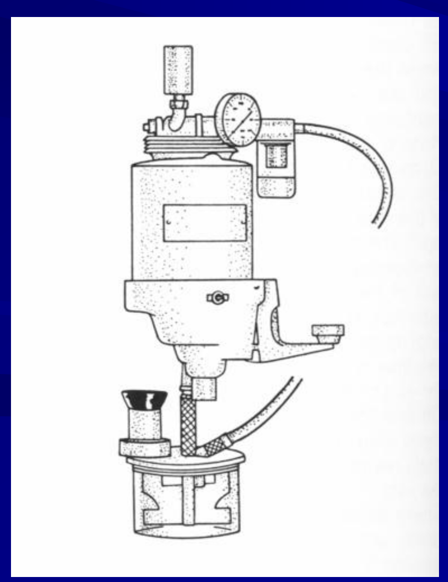


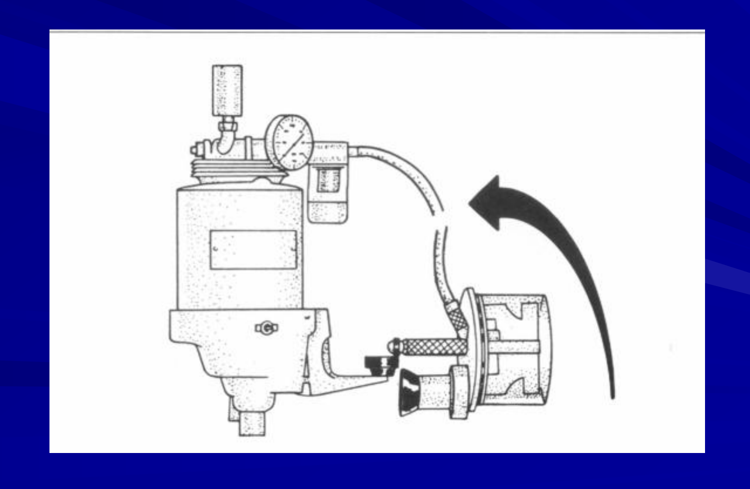


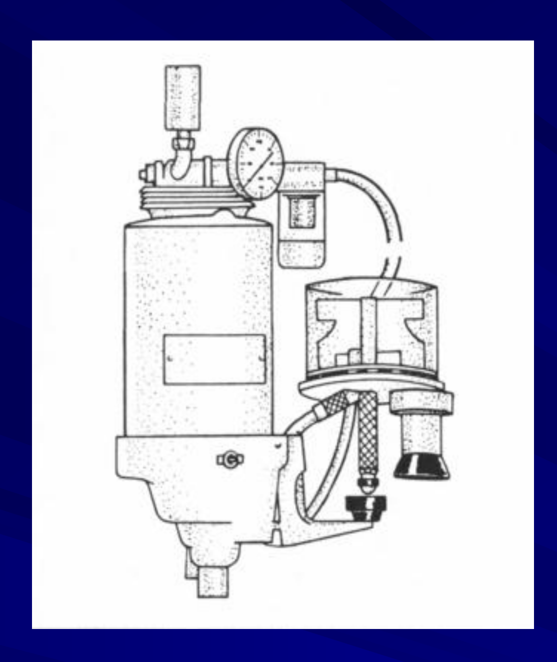
Vacuum technique

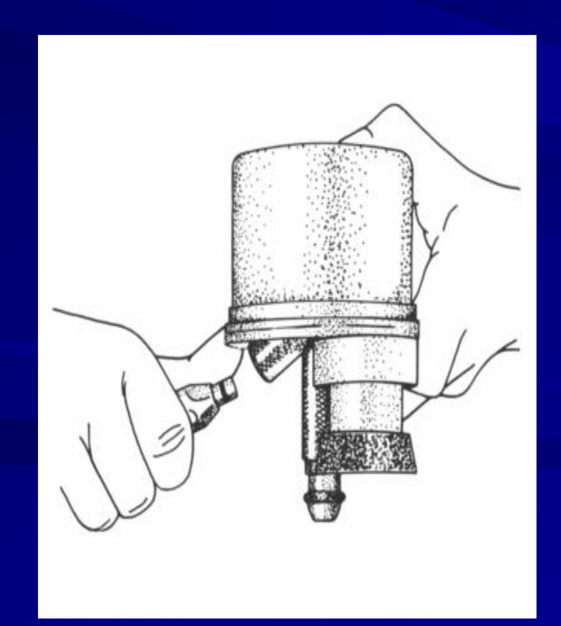




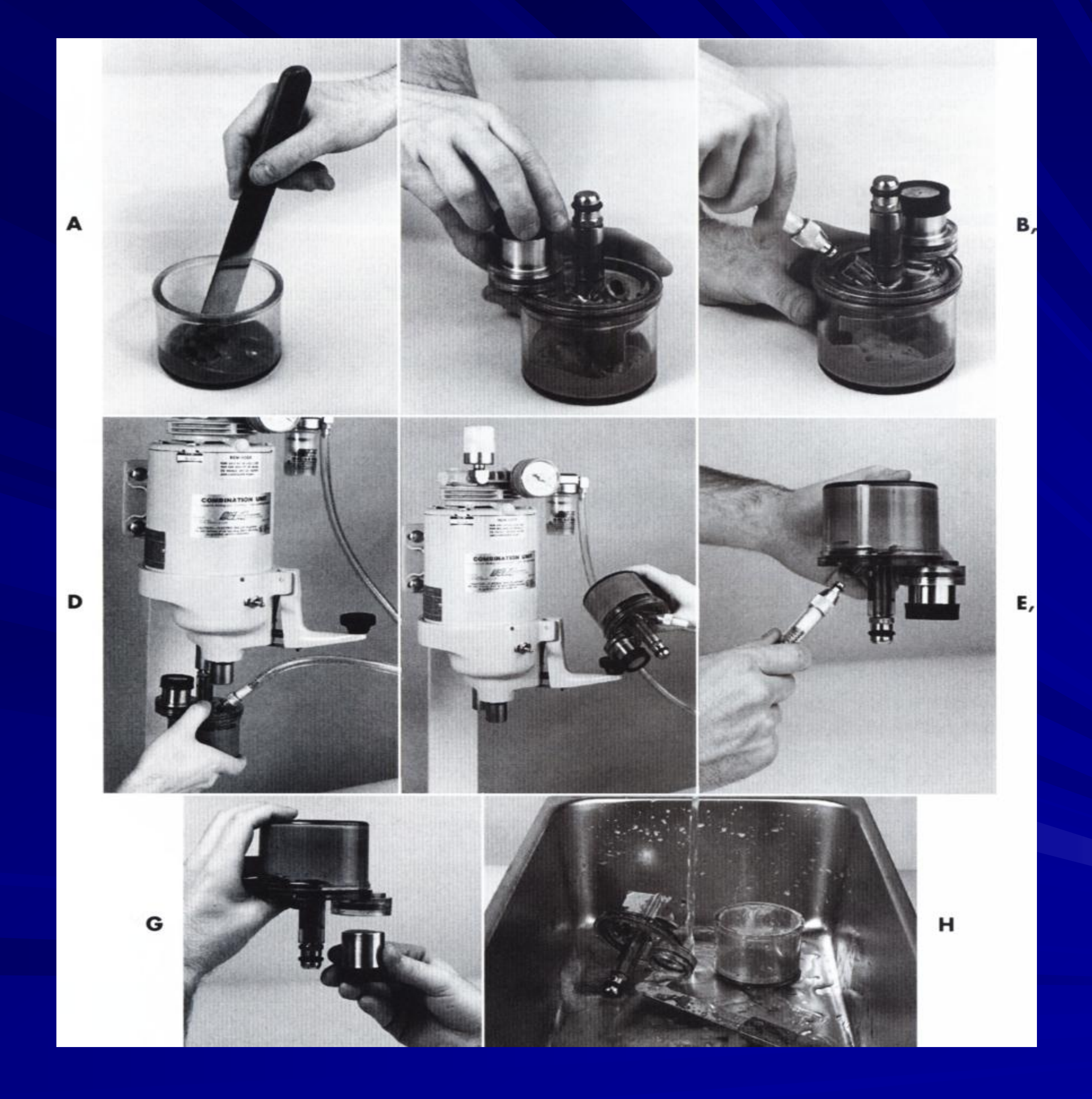










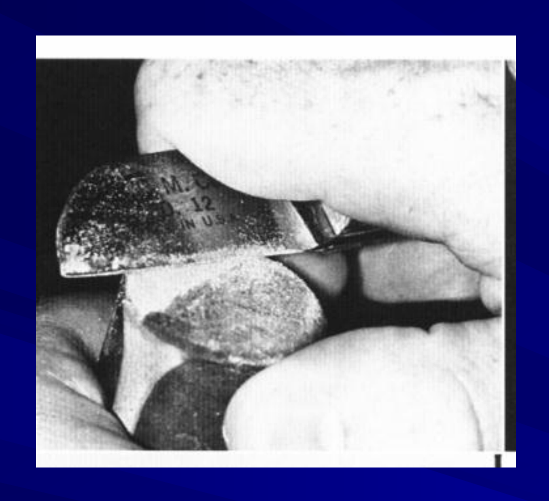

A
B,
D
E,
G
H

Double investing





Separation of crucible former







Wax elimination (burnout)

Aims:

- Complete elimination of wax to obtain an empty mold
- Obtain adequate thermal expansion
- Elevates the temperature of the investment to prepare it for casting

Burnout temperatures

- Gypsum-bonded: 650-700°c
- Phosphate-bonded: 850-900°c



Whip Mix

Whip Mix


Thank You!